authorities advocate darkroom, dilation or prone provocative tests, but their value is controversial.

Immediate treatment is aimed at reducing the intraocular pressure with intravenous administration of acetazolamide and a hyperosmotic agent such as mannitol or glycerin while concurrently pulling the iris away from the angle with topical 2 percent solution of pilocarpine. Definitive therapy consists of peripheral iridectomy which deflates the billowing iris. Classically, this has been done surgically with excellent safety and effectiveness. Recently, lasers have been used by some to produce a hole in the iris. This is not always successful but theoretically is safer. Postoperatively, supplemental use of antiglaucoma medication may be necessary if permanent damage has occurred to the outflow system. Prophylactic iridectomy is advocated by many for the other eye because the disease is usually bilateral.

This rare disease is frequently misdiagnosed. Since complete cure may be obtained if caught in time, early diagnosis is mandatory.

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Automated Refraction

CLINICAL REFRACTION is that part of the opthalmologic examination concerned with the diagnosis and treatment of refractive errors. Automated refraction aims to expedite this by instruments requiring minimal operator skill and minimal patient cooperation. Such instruments may be objective or subjective.

Objective refractors measure dioptric status of the eye independent of patient responses. The patient is only required to stay reasonably still and look at a distant fixation target or its equivalent. The earliest and occasionally still useful objective instrument is the ophthalmoscope. The conventional clinical instrument is the retinoscope. Advances in electronics and microcomputers have made possible devices using infrared light and image analysis which reduce measuring time to a matter of seconds. A calibration bias is built into the instrument to compensate for chromatic aberration, and intermittent or automatic blurring (fogging) inhibit instrument accommodation. Poor patient cooperation and cloudy ocular media limit accuracy. Most 5-year-old children can be examined, and overrefraction for aphakia and contact lens fitting is possible. A warning signal or blank printout indicates instrumental difficulties. Currently available commercial automated instruments are the 6,600 Auto-Refractor (Acuity Systems, Inc.) and the Dioptron II (Coherent, Inc.). Electrophysiologic techniques using visual evoked potentials to measure refraction are in the research stage.

Subjective refractors are partially automated devices based on the optometer principle using innovative lens systems and targets to overcome instrument accommodation and facilitate subjective discrimination. Computers expedite target sequences and recordng. Total time depends on how many tests are done and ranges from 5 to 20 minutes per patient. Greater operator skill and more patient cooperation are required than with objective devices. Inadequate measurements are confirmed by poor acuity. Two currently available commercial subjective refractors are the SR-III (American Optical Co.) and the Vision Analyzer (Humphrey Instruments, Inc.). Laser and other computerized refracting systems are in developmental stages.

All automated refractors are designed to be operated by technicians after "a few hours training." Objective instruments do not tell what the patient sees, how he sees, or even if he has seen; a perfectly valid but useless reading can be obtained on a blind eye. The experienced clinician, therefore, seldom prescribes from objective measurements if he has the option of confirming results subjectively. Accuracy equals but does not exceed competent retinoscopy—the only procedure objective refractors replace. Subjective refractors conserve space and time but may not allow for evaluation of presbyopia, binocular motility, and accommodative anomalies, often an integral part of clinical refraction. Accuracy of subjective instruments is comparable to standard subjective tests. Precise correlations are not possible since different corrections may give equal acuity. In all cases, the final prescription for spectacles, if any, depends on symptomology as well as machinery.

The chief advantages of automated refractors, aside from participating in the seemingly headlong rush to computerize everything in sight, are to provide convenient rapid measurements requir-

ing limited patient cooperation. This is particularly useful in children and illiterates, and in mass screening programs. It also provides a measure of comfort to those who consider routine refractions a drudge. How much patient contact time should be delegated to nonprofessionals in the interest of efficiency is another problem.

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